

A new species of the genus *Neoacarus* (Acari: Hydrachnidiae) from Japan

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Abstract — A new species of water mite genus *Neoacarus* is described on the basis of the specimens collected at a mountain stream in Saitama Prefecture, Japan. The new species is distinguished from the congeners by its somewhat long ventral shield and ventral chaetotaxy, and ventrally swollen tarsi of the fourth legs. This is the first record of the genus *Neoacarus* from the Asian region.

Key words — new species, *Neoacarus*, Hydrachnidiae, water mites, Japan.

Introduction

The water mite genus *Neoacarus* Halbert 1944 is one of the two genera in the family Neoacaridae Motas & Tanasachi 1947. The genus is generally found in interstitial habitats of streams and lakes in temperate Holarctic Region (Cramer & Smith 1991). The genus exhibits typical Tertiary-relict distributions in North America and is considered to originate in Laurasia during the late Cretaceous (Smith & Cook 2001). Up to the present, 15 species have been known widely in Europe (Ireland, England, Germany, France, Switzerland, Hungary, Romania, and Poland) and North America (Canada, USA, and Mexico). Imamura (1965) briefly mentioned the classification of the family Neoacaridae in the Japanese review of water mites. However, *Neoacarus* had not been found in Japan. Recently, *Neoacarus* was collected among riverine gravels in a small mountain stream at Saitama Prefecture, Japan. This is the first record of *Neoacarus* from the Asia-Pacific region. The present paper deals with a new species of the genus *Neoacarus* discovered in Japan.

Measurements are given in micrometers (μm).

Abbreviations: p-1 to p-5, first to fifth segments of palp; Leg I to Leg IV, first to fourth legs; L/W, ratio of length to width.

Genus *Neoacarus* Halbert 1944

[Japanese name: Aratadani-zoku]

Neoacarus Halbert 1944: 91–92; Husmann 1956: 126–127; Cook 1974: 389–390; Cramer & Smith 1991: 806; Smith 2003: 258.

Orcophilus Walter 1947: 233.

Persephonacarus Motas & Tanasachi 1947: 304.

Diagnosis. Ventral shield with the fourth coxal plates extending posterior to genital field forming a genital bay. Gonopore bearing 3–5 pairs of genital acetabula in males

and 6–14 genital acetabula on each acetabular plate in females. Pedipalps stocky and uncate. Distal-ventral projection of palpal tibia not extending to tip of tarsus. Tibia of the third pair of legs expanded and flattened bearing numerous modified setae in males.

Type species: *Neoacarus hibernicus* Halbert 1944

Neoacarus japonicus sp. nov.

[Japanese name: Nihon-aratadani]

(Figs. 1–3)

Type specimens. Holotype: male, in riverine gravels, Gonotsubo River, Arakawa River System, Gonotsubo, Yorii Town, Oosato County, Saitama Prefecture, Japan, 24 March 2009, K. Tominaga leg. Paratype: male, data same as the holotype.

Type-depository. Holotype (NSMT Ac-13618) and paratype (NSMT Ac-13619): Department of Zoology, National Museum of Nature and Science, Tokyo.

Etymology. The specific epithet refers to the collecting country, Japan.

Male (holotype): Idiosoma somewhat flat oval. Chitinous cuticle almost entirely ornamented with fine punctations. Eyes conspicuous. Color in life unknown.

Dorsal shield (Fig. 1A) oval, 566 long, 426 wide, L/W 1.33. Four pairs of fine filiform setae placed on the lateral portion. Second to fourth pairs of dorsal setae attendant on dorsal pores.

Ventral shield (Fig. 1B) long oval, 672 long, 460 wide, L/W 1.46. First coxae fused medially, second to fourth coxae separated with suture lines. Posterior part of fourth coxae extending posteriorly to the genital field and forming rather deep genital bay. Ventral setae filiform, nine pairs placed on the coxal shields. Genital field 157 long, 123 wide, surrounded with two anterior pairs of long filiform setae, two posterior pairs of short fine setae, and one pair of small gland pores. Gonopore 132 long, flanked by one anterior and two or three posterior pairs of fine filiform setae,

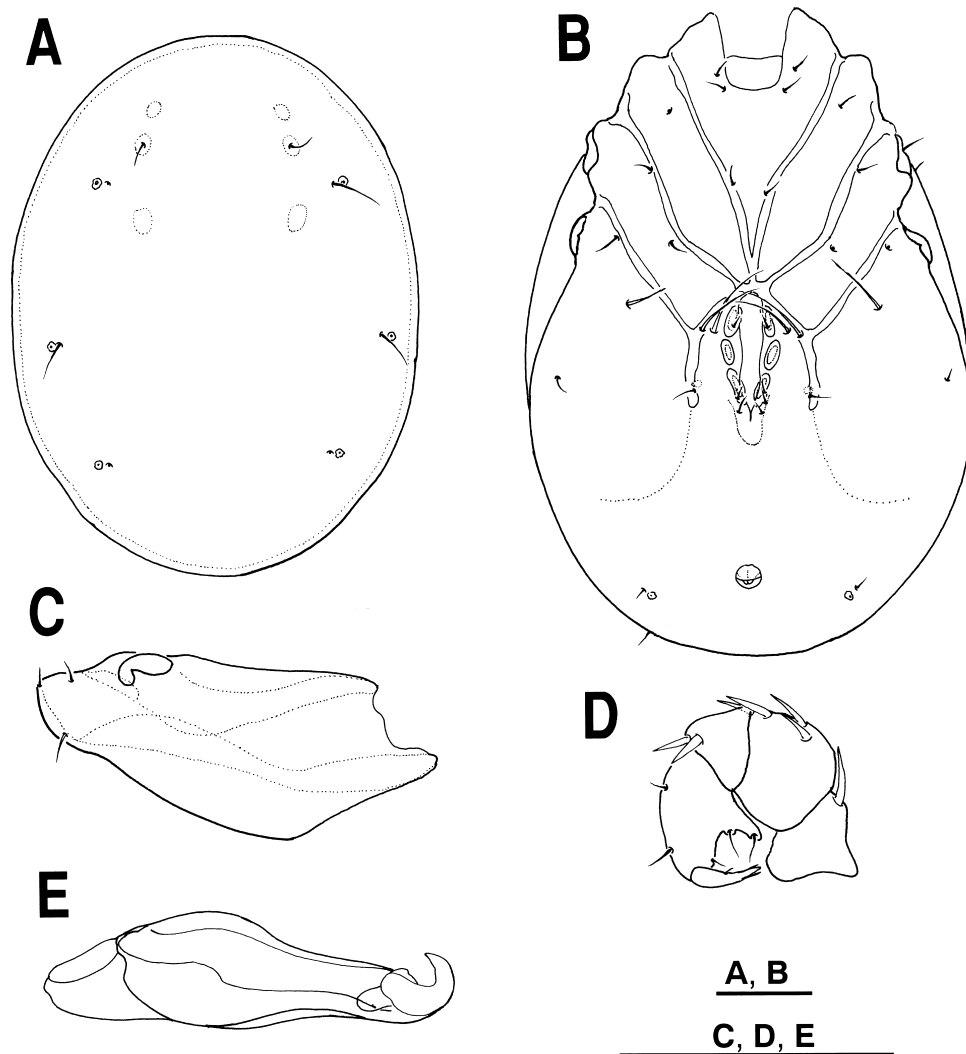


Fig. 1. *Neoacarus japonicus* sp. nov., male (holotype). — A, dorsal shield; B, ventral shield; C, capitulum (palp and chelicera are omitted, lateral view); D, left palp; E, left chelicera. Scale bars: 100 μ m.

bearing three pairs of elongate genital acetabula. Anal pore 25 long, open on posterior to gonopore.

Capitulum (Fig. 1C) 155 long, bearing fine rostral setae. Palp (Fig. 1D) massive and strongly bending down to venter, forming a pincer at the distal portion; p-1 short cylindrical, with one spiniform dorsal seta; p-2 robust, with four spiniform dorsal setae; p-3 short cylindrical, with two spiniform dorsal setae; p-4 massive, with a horn-like ventral projection and two dorsal and three ventral fine filiform setae; p-5 short, conical, with one fine ventral seta and three distal projections. Measurements of palpal segments are shown in Table 1. Chelicera (Fig. 1E) 152 long, with hooked claw, bearing small hyaline membrane dorsad to proximal part of claw.

Legs (Fig. 2) each with filiform, spiniform, and somewhat serrated setae. Tarsus with two bifurcate claws. Telfemora I and III furnished with long spiniform ventral setae. Telfemora, genua and tibiae III and IV furnished with a lot of filiform or finely serrated ventral setae. Tibia

III strongly expanded ventrally, gradually tapering towards distal end. Tarsus IV swollen ventrally at middle portion. Measurements of leg segments are given in Table 2.

Female. Unknown.

Distribution. Saitama Prefecture, central Honshu, Japan.

Remarks. Up to date, the following 15 species in the genus *Neoacarus* have been known: *Neoacarus adocetus* Cramer and Smith 1991, *N. californicus* Smith 2003, *N. davecooki* Smith 2003, *N. expansus* Cook 1963, *N. fontanalis* Smith 2003, *N. hibernicus* Halbert 1944, *N. lacus* Smith 1976, *N. minimus* Cook 1968, *N. minutus* Smith 2003, *N. motasi* Cook 1963, *N. occidentalis* Cook 1968, *N. ozarkensis* Cook 1963, *N. rivulus* Smith 2003, *N. rotundus* Smith 2003, *N. similis* Cook 1963. Among the above-listed species, *N. hibernicus* is widely distributed in Europe and an only species recorded from the Eurasian Continent. On the other hand, the other 14 species were found in the North American Continent. The present new species is the first described *Neoacarus* species from the Asian region. With

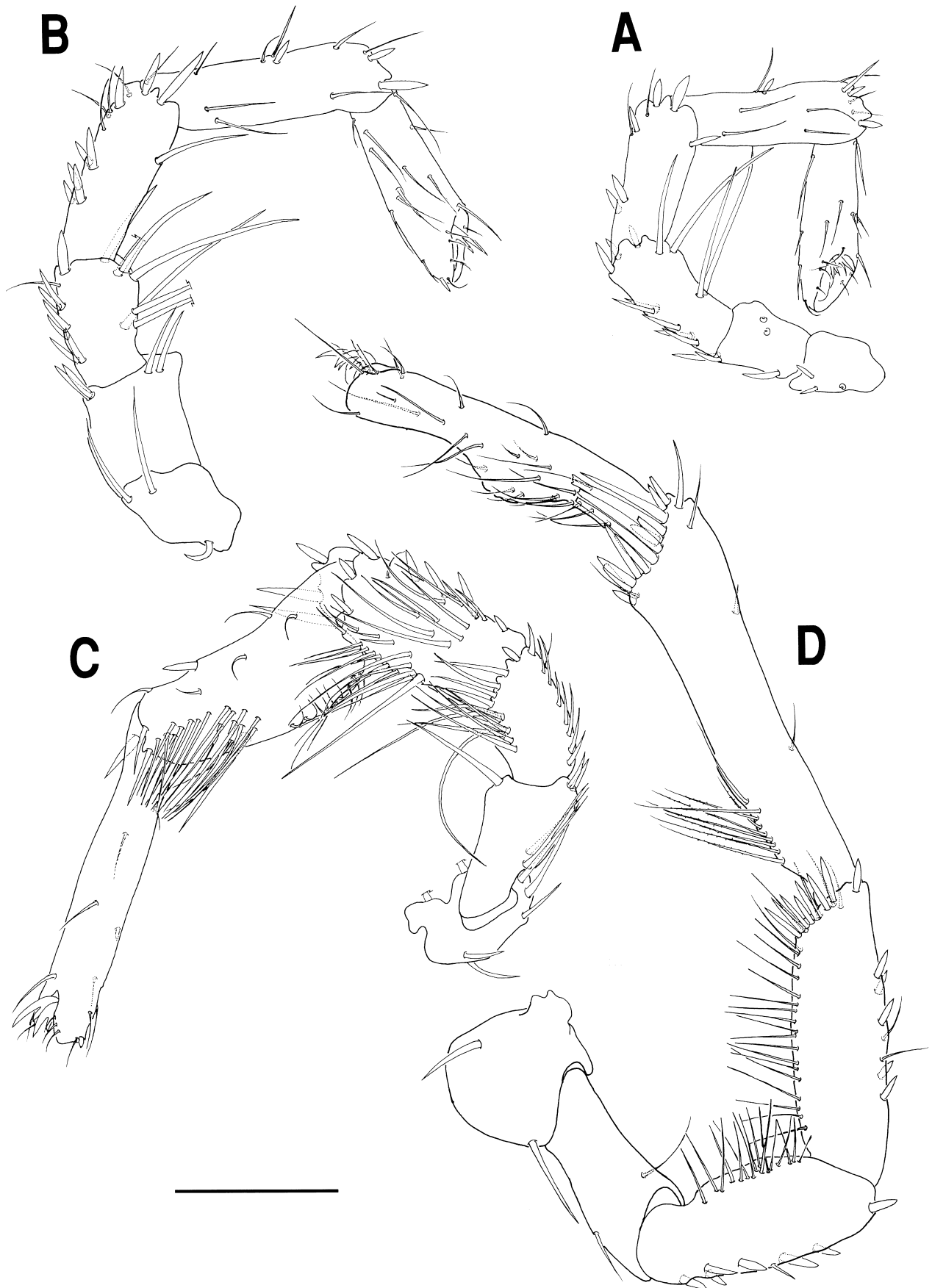


Fig. 2. *Neoacarus japonicus* sp. nov., male (holotype). — A, left leg I; B, left leg II; C, left leg III; D, left leg IV. Scale bar: 100 μ m.

Table 1. Measurements of left palp segments.

| | p-1 | p-2 | p-3 | p-4 | p-5 |
|----------------|-----|-----|-----|-----|-----|
| Dorsal length | 32 | 42 | 26 | 43 | 26 |
| Ventral length | 19 | 28 | 8 | 23 | 19 |
| Maximum height | 32 | 42 | 28 | 38 | 8 |

Table 2. Measurements of left leg segments.

| | Trochanter | Basifemur | Telofemur | Genu | Tibia | Tarsus |
|---------|------------|-----------|-----------|------|-------|--------|
| Leg I | 57 | 75 | 83 | 108 | 132 | 132 |
| Leg II | 66 | 85 | 83 | 124 | 147 | 150 |
| Leg III | 75 | 90 | 85 | 132 | 158 | 203 |
| Leg IV | 89 | 103 | 154 | 192 | 279 | 208 |

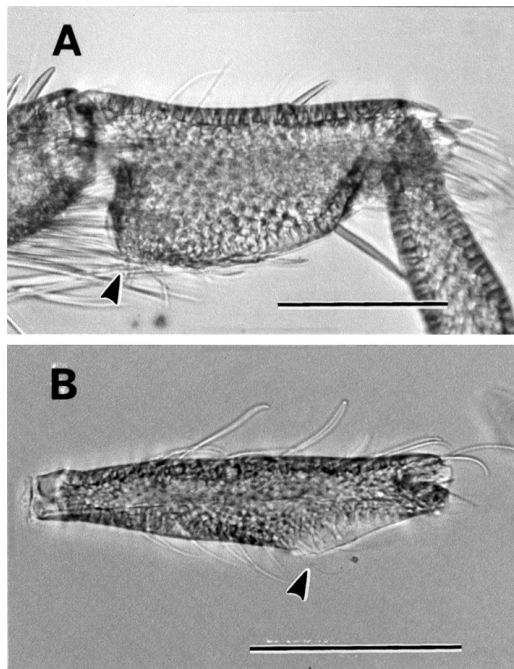


Fig. 3. *Neoacarus japonicus* sp. nov., male (paratype). — A, tibia of leg III; B, tarsus of leg IV. Arrow indicates a swollen portion of the leg segment. Scale bars: 100 μ m.

regard to the geographic distribution of *Neoacarus* species, *Neoacarus* is considered to originate in the North American part of Laurasia during the Cretaceous, and thereafter diverged into Europe (*N. hibernicus*) and the north eastern Asia (*N. japonicus*). Such a process of geographic evolution can explain the scarcity of the *Neoacarus* species in the Eurasian Continent.

Compared with so far known 15 species, the present new species is closely related to *N. adocetus* and *N. occidentalis*. However, *N. japonicus* differs from these two species in having a somewhat long ventral shield and nine pairs of setae on the coxal shields. In general, only the tibiae of the third pair of legs are expanded ventrally (Fig. 3A) in *Neoacarus* species. In *N. japonicus*, however, the tarsi of the fourth pair of legs are also expanded ventrally at the middle portion (Fig. 3B). Such a peculiar feature of the fourth tarsi is a newly found characteristic in the genus

Neoacarus.

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References

- Cook, D. R. 1963. Studies on the phreaticolous water mites of North America: The family Neoacaridae. *Ann. Ent. Soc. Amer.*, 56: 481–487.
- Cook, D. R. 1968. New species of *Neoacarus* Halbert and *Volsellacarus* Cook from North America. *Proc. Ent. Soc. Wash.*, 70: 67–74.
- Cook, D. R. 1974. Water mite genera and subgenera. *Mem. Am. Ent. Inst.*, 21: 1–860.
- Cramer, C. & Smith, I. 1991. New species of water mites (Acari: Hydrachnida) of the genera *Bandakia* (Anisitsiellidae), *Chappuisides* (Chapuisiidae), and *Neoacarus* (Neoacaridae) from Mexico. *Can. Ent.*, 123: 795–809.
- Halbert, J. N. 1944. List of Irish fresh-water mites (Hydracarina). *Proc. Roy. Irish Acad. Sect. B*, 50: 39–104.
- Husmann, S. 1956. Untersuchungen über die Grundwasserfauna zwischen Harz und Weser. *Arch. Hydrobiol.*, 52: 1–184.
- Imamura, T. 1965. Hydrachnellae. pp. 216–251. In: Sasa, M. (ed.) *Mites. An Introduction to Classification, Bionomics and Control of Acarina*. University of Tokyo Press, Tokyo, 486pp. (In Japanese)
- Motas, C., Tanasachi, J. & Orghidan, T. 1947. Un nouveau Hydracarien phréatique recueilli en Transylvanie. *Acad. Roum. Bull. Sect. Sci.*, 29: 303–307.
- Smith, I. M. 1976. An unusual new species of *Neoacarus* (Acari: Parasitengona: Neoacaridae) from a lake in Ontario. *Can. Ent.*, 108: 993–995.
- Smith, I. M. 2003. North American species of *Neoacarus* Halbert, 1944 (Acari: Hydrachnida: Arrenuroidea: Neoacaridae). pp. 257–302. In: Smith, I. M. (ed.) *An Acarological Tribute to David R. Cook* (From Yankee Springs to Wheeny Creek). Indira Publishing House, West Bloomfield, 331pp.
- Smith, I. M. & Cook, D. R. 2001. Water mites (Hydrachnida) and other arachnids. pp. 551–659. In: Thorp, J. H. & Covich, A. P. (eds.) *Ecology and Classification of North American Freshwater Invertebrates*. Academic Press, San Diego, etc., 1056pp.
- Walter, C. 1947. Neue Acari (Hydrachnellae, Porohalacaridae, Trombidiidae) aus subterranean Gewässern der Schweiz und Rumäniens. *Verh. Naturf. Ges. Basel*, 8: 146–238.

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